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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

EX PARTE KOBAYASHI et al.

Application for Patent

Filed July 7, 2000

Serial No. 09/611,562

FOR:
HEAT EXCHANGER

APPEAL BRIEF

CERTIFICATE OF MAILING

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I. REAL PARTY IN INTEREST

The real parties in interest are Masahiro Kobayashi, Hideaki Mukaida, Hiroshi Mukaiyama, Norio Sawada, Masafumi Ueda, Shigeya Ishigaki and Koji Sato, the inventors named in the subject application, and Sanyo Electric Co., the assignee of record.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals and/or interferences.

III. STATUS OF THE CLAIMS

A total of 6 claims were presented during prosecution of this application. Applicant appeals rejected claims 6-11.

IV. STATUS OF THE AMENDMENTS

Applicant files an amendment under 37 CFR 1.116 together with this Appeal Brief.

V. SUMMARY OF THE INVENTION

Applicants' invention is directed to a heat exchanger in which high heat transfer efficiency has been attained by optimizing the slit array and setting an optimum range for the width of a slit and the spacing between slits. Slits 51 and 52 formed in front of the heat transfer tube 4 and slits 55 and 56 formed behind said heat transfer tube are arranged so as to provide a mutually different length among adjoining partitioned slits in the vertical direction, as well as a mutually different length between directly opposite partitioned slits in the horizontal direction. As a result, the position at which the slit is partitioned is staggered. The

two slits 53 and 54 formed side by side between heat transfer tube 4 and heat transfer tube 4 are of the same length. For a 7 mm diameter heat transfer tube, the slit width relative to the diameter of the heat transfer tube ranges from $1.2/7$ (approximately 0.17) to $2.0/7$ (approximately 0.29), and the slit spacing relative to the diameter of the heat transfer tube ranges from $1.3/7$ (approximately 0.18) to $3.5/7$ (approximately 0.5).

VI. ISSUES

1. Were claims 6, 8 and 10 properly rejected under 35 U.S.C. § 102(b) as being being anticipated by Kang et al. (US-5,755,281, hereinafter Kang)?
2. Were claims 7 and 9 properly rejected under 35 U.S.C. § 103(a) as being being unpatentable over Kang et al. (US-5,755,281, hereinafter Kang) in view of Park et al. (US-5,975,199, hereinafter Park)?

VII. GROUPING OF THE CLAIMS

Applicant proposes three groups of claims to stand or fall individually. The first group includes claim 6 (“Group I”). The second group includes claims 8-9 (“Group II”). The third group includes claims 10-11 (“Group III”).

VIII. ARGUMENTS

A. The related law

It is impermissible, however, simply to engage in a hindsight reconstruction of the claimed invention using the Applicant’s structure as a template and selecting elements from references to fill the gaps. In re Gorman, 933 F. 2d 982, 987, 18 USPQ 2d 1885 (Fed. Cir. 1991).

A prima facie case of obviousness requires that the reference teachings “appear to have suggested the claimed subject matter.” In re Rinehart, 531 F.2d 1048, 189 USPQ 143, 147 (CCPA 1976).

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

When more than one reference or source of prior art is required in establishing the obviousness rejection, “it is necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification.” In re Lalu, 747 F.2d 703, 223 USPQ 1257, 1258 (Fed. Cir. 1984).

B. The rejections

1. *Claims 6, 8 and 10 were improperly rejected under 35 U.S.C. § 102(b) as being anticipated by Kang et al. (US-5,755,281, hereinafter Kang).*
2. *Claims 7 and 9 were improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Kang et al. (US-5,755,281, hereinafter Kang) in view of Park et al. (US-5,975,199, hereinafter Park).*

1. The rejections

1. *The Office Action rejected claim 6 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

The Office Action asserted that “the claimed subject matter of “N = the number of slit arrays/the number of fin units” renders the scope of the claim indefinite since it is not clear if

N is the total number of slit array per fin unit or per all the fin units of the transfer fin. Furthermore, applicants do not disclose that how many fin units are in the structure nor the number of slit arrays on any fin unit”.

2. *The Office Action rejected claims 6, 8 and 10 under 35 U.S.C. § 102(b) as being anticipated by Kang et al. (US-5,755,281, hereinafter Kang).*

The Office Action asserted that “Kang discloses (Figure 10) a heat exchanger comprising a heat transfer coil (30) penetrate through a row of multiple plate-shape heat transfer fins (20); air (A) is supplied orthogonally to the heat transfer coil; the heat transfer fin is partitioned in at least one fin unit in which arrays of slits are arranged in a row”. First Office Action, pg. 2 of paper 17.

The Office Action asserted that “As regarding Claim 6, the formula $W_s \geq (1 - 0.1(6 - N))W_f / (2N + 1)$, can be rearranged as $W_s / W_f \geq (1 - 0.1(6 - N)) / (2N + 1)$.” First Office Action, pg. 2-3 of paper 17.

Further, the Office Action asserted that “basing on the geometrical relationship of figure 10, the ratio between the width of the slit to the width of the fin is $W_s / W_f = 0.067$. Therefore, as long as N or number of slit array on the fin is greater than 8.2, the formula is satisfied. Kang discloses (figure 9) that the fin has more than 9 slit arrays. Therefore, the formula is satisfied. First Office Action pg. 3, paper 17.

Further, the Office Action asserted that “basing on the geometrical relationship of figure 10, the ratio between the width of the slit and spacing between two slits to the diameter of the tube (30) are same, which is approximately 0.22. This ratio is within the claimed range 0.17 – 0.29 and 0.18 – 0.5 of the invention. First Office Action pg. 3, paper 17.

Furthermore, the Office Action asserted that “regarding applicant’s argument that it is improper to use proportions of the elements in the drawing, has been very carefully considered but not deemed persuasive. It has been stated in rule CFR 1.84 (k)(3) of the

MPEP that “Elements of the same view must be in proportion to each other, unless a difference in proportion is indispensable for the clarity of the view”. The Examiner has taken the geometrical relationship of the Ws, Wf and spacing between two slits from the same view of figure 10. Therefore the measured ratio is considered to be readable on the claimed range.” First Office Action, pg. 3 of paper 17.

3. The Office Action rejected Claims 7 and 9 under 35 U.S.C. § 103(a) as being being unpatentable over Kang et al. (US-5,755,281, hereinafter Kang) in view of Park et al. (US-5,975,199, hereinafter Park).

The Office Action asserted that “Kang substantially discloses all of the claimed invention as discussed above except for the limitation that the tube has a diameter of about 7 mm. Park discloses (figure 1 and col. 4, line 66 – col. 5, line 4) a heat exchanger that has coil (2) with a diameter of 7mm been used in industrial application to make a heat exchanger. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Parker’s teachings in Kang’s heat exchanger to make the heat exchanger.” First Office Action pg. 4-5 of paper 17.

2. The prior art

Kang (US-5,755,281): Kang substantially discloses a fin tube heat exchanger including a plurality of fin plates spaced at regular intervals in parallel with one another and adapted to allow air to flow therebetween, each fin plate having a plurality of through-holes in at least one row in a longitudinal direction of the fin plates, a plurality of refrigerant tubes inserted into the through-holes of the fin plates in a perpendicular direction and a plurality of raised strips formed in a plurality of rows in a direction perpendicular to an air flow. The raised strips in the same row are raised from a fin base in a direction opposite to the direction in which the raised strips in adjacent rows are raised. The fin base and each of the raised

strips define therebetween two openings open against the air flow. Rising portions on the refrigerant tube side of the raised strips in one row near to a center line of the through-holes are formed along a circular arc which has an identical center with the refrigerant tube. Rising portions on the refrigerant tube side of the raised strips in another row near to a longitudinal fin edge are formed along an outer tangential line of the circular arc. The number of the raised strips in another row near to the longitudinal fin edge is more than the number of the raised strips in one row near to the center line of the through-holes.

However, Kang substantially does not mention any thing related to geometric relationship such as, ratio slit width to the fin width as required by Claim 6. Kang also substantially fails to disclose a geometric arrangement of slits such as arrangements of slits in an array having slit width within a range of 0.17 to 0.29 times the diameter of one refrigerant tube as required by Claim 8. Further, Kang also substantially fails to disclose a geometric arrangement of slits such as arrangement of slits in an array having spacing within a range of 0.18 to 0.5 times the diameter of one refrigerant tube between the slits as required by Claim 10.

However, the Office Action asserted that “it has been stated in rule CFR 1.84 (k)(3) of the MPEP that “Elements of the same view must be in proportion to each other, unless a difference in proportion is indispensable for the clarity of the view”. The Examiner has taken the geometrical relationship of the W_s , W_f and spacing between two slits from the same view of figure 10. Therefore the measured ratio is considered to be readable on the claimed range.”
First Office Action, pg. 3 of paper 17.

Park (US-5,975,199): The Office Action relied upon Park to merely show a refrigerant tube with outer diameter of 7 mm.

3. The Rejection under 35 U.S.C. 112

35 U.S.C. § 112, second paragraph

Applicants respectfully submit that an amendment under 37 CFR 1.116 is being filed in a accompanying paper along with this appeal in order to overcome the indefinite rejections under 35 U.S.C. 112, second paragraph. Upon entry of the amendments to Claim 6, it is believed that the rejections under 35 U.S.C. 112, second paragraph can be overcome. Withdrawal of this rejection is requested.

4. The prior art distinguished

Under 35 U.S.C. § 102(b)

Applicants respectfully submit that Kang cannot anticipate independent Claim 6 for at least the reason Kang substantially fails to disclose every features of claim 6. In other words, Kang substantially fails to disclose a heat exchanger comprising at least “the arrangement of slits in an array of slits satisfying the following formula: $W_s \geq [1 - 0.1(6 - N)] \times W_f / (2N + 1)$, wherein W_s = width of one slit, W_f = width of a fin unit, and N = the number of slit arrays or the number of heat transfer fin units”, as required by the amended Claim 6. The advantage of the above geometric relationship between the arrangement of slit arrays satisfying the above formula is that a heat exchanger with a maximum heat exchange efficiency can be obtained.

The Office Action asserted that “as regarding Claim 6, the formula $W_s \geq (1 - 0.1(6 - N))W_f / (2N + 1)$, can be rearranged as $W_s / W_f \geq (1 - 0.1(6 - N)) / (2N + 1)$.” First Office Action, pg. 2-3 of paper 17. Further, the Office Action asserted that “basing on the geometrical relationship of figure 10, the ratio between the width of the slit to the width of the fin is $W_s / W_f = 0.067$. Therefore, as long as N or number of slit array on the fin is greater than 8.2,

the formula is satisfied. Kang discloses (figure 9) that the fin has more than 9 slit arrays. Therefore, the formula is satisfied. First Office Action pg. 3, paper 17.

Applicants respectfully disagree. Claim 6 has been amended under 37 CFR 1.116 to more clearly define the invention and to overcome the rejections under 35 U.S.C. 112, second paragraph. In the amended claim 6, N has been defined as “N = the number of slit arrays or the number of heat transfer fin units”.

Applicants would like to point out that Kang does not teach or suggest the formula of claim 6. Indeed, Kang substantially fails to mention any relationship between slit width and the fin width and, therefore, Kang cannot anticipate Claim 6.

In rejecting claims 8 and 10, the Office Action asserted that “basing on the geometrical relationship of figure 10, the ratio between the width of the slit and spacing between two slits to the diameter of the tube (30) are same, which is approximately 0.22. This ratio is within the claimed range 0.17 – 0.29 and 0.18 – 0.5 of the invention. First Office Action pg. 3, paper 17.

Applicants respectfully disagree and would like to point out that no where in Kang patent is there any disclosure describing the ratio between the width of the slit and the spacing between two slits to the diameter of the tube is 0.22.

In rejecting claims 8 and 10, The Examiner has solely relied on his measurement of Fig. 10 of Kang. However, as stated in Hockerson-Halberstadt, Inc. v. Avia Group Int'l, Inc., 55 USPQ 2d 1487, 1491 (Fed, Cir 2000), “it is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue”. In re Wright, 569 F.2d 1124, 1127, 193 USPQ 332(CCPA 1977), “absent any written description in the specification of quantitative values, arguments based on measurement of a drawing are of little value”.

In MPEP section 2125, it is clearly stated that *"proportions of features in a drawing are not evidence of actual proportions when drawings are not to scale"*.

Clearly, the standard upon which the Examiner has based his construction of the reference disclosure is fully improper. Accordingly, Applicants respectfully submit that Kang cannot possibly anticipate Claims 8 and 10.

For at least the foregoing reasons, Applicants respectfully submit that Kang cannot anticipate Claims 6, 8 and 10. Withdrawal of these rejections is respectfully requested.

Under 35 U.S.C. § 103(a)

The Office Action asserted that "Kang substantially discloses all of the claimed invention as discussed above except for the limitation that the tube has a diameter of about 7 mm. Park discloses (figure 1 and col. 4, line 66 – col. 5, line 4) a heat exchanger that has coil (2) with a diameter of 7mm been used in industrial application to make a heat exchanger. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Parker's teachings in Kang's heat exchanger to make the heat exchanger." First Office Action pg. 4-5 of paper 17.

Applicants respectfully disagree and respectfully submit that even though the Examiner relied upon Park to disclose a tube with a 7mm diameter, still Park cannot cure the specific deficiencies of Kang for reasons as substantially discussed above. Accordingly, Applicants respectfully submit that claims 6 and 8 as well as their dependent claims 7 and 9 patently define over Kang and Park. Reconsideration and withdrawal of these rejections is respectfully requested.

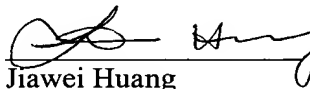
IX. CONCLUSION

As noted, none of the cited art, either alone or in combination, can be said to anticipate and/or render obvious the appealed claims. Accordingly, Applicant respectfully submits that claims 6-11 patentably define over the cited references.

Accordingly, Applicant believes that the rejections under 35 U.S.C. § 102 and 35 U.S.C. § 103 are in error, and respectfully requests the Board of Patent Appeals and Interferences to reverse the Examiner's rejections of the claims on appeal.

Respectfully Submitted,
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APPENDIX A - CLAIMS ON APPEAL

Claims 1-5 (Canceled)

6. (Currently Amended) A structure of heat transfer fin mounted within a heat exchanger that includes a plurality of heat transfer coils tubes penetrating through the heat transfer fin, wherein air is supplied orthogonally to said heat transfer coils tubes, and the heat transfer fin is partitioned in at least one fin unit in which arrays of slits are arranged in a row, the heat transfer fin being characterized in that the arrangement of the arrays of slits satisfies the following formula:

$$W_s \geq [1 - 0.1(6 - N)] \times W_f / (2N + 1)$$

Wherein W_s = width of one slit, W_f = width of a fin unit, and N = the number of slit arrays ~~/~~ or the number of heat transfer fin units.

7. (Currently Amended) The heat exchanger of claim 6, wherein each heat transfer coil tube has a diameter of about 7mm.

8. (Currently Amended) A structure of heat transfer fin mounted within a heat exchanger that includes a plurality of heat transfer coils tubes penetrating through the heat transfer fin, wherein air is supplied orthogonally to said heat transfer coils tubes, and the heat transfer fin is partitioned in at least one fin unit in which arrays of slits are arranged in a row, the heat transfer fin being characterized in that the width of each slit is within a range of about 0.17 to 0.29 times the diameter of one heat transfer coil tube.

9. (Currently Amended) The heat exchanger of claim 8, wherein a diameter of one heat transfer coil tube is about 7mm.

10. (Currently Amended) A structure of heat transfer fin mounted within a heat exchanger that includes a plurality of heat transfer coils tubes penetrating through the heat transfer fin, wherein air is supplied orthogonally to said heat transfer coils tubes, and the heat

transfer fin is partitioned in at least one fin unit in which arrays of slits are arranged in a row, the heat transfer fin being characterized in that the spacing between slits in each array is within a range of about 0.18 to 0.5 times the diameter of one heat transfer ~~coil~~tube.

11. (Currently Amended) The heat exchanger of claim 10, wherein a diameter of one heat transfer ~~coil~~tube is about 7mm.